Proposal to InternetNZ

Digital Earth Summit on Sustainability 2008

"We can't solve problems by using the same kind of thinking we used when we created them." Albert Einstein

In 1998, US Vice-President Al Gore described a virtual representation of the Earth, available on the Internet, spatially referenced and connected to the world's digital knowledge archives. Any citizen, linked through the Internet, would be able to access free information and a commercial marketplace of products and services. That vision and the movement that has followed it are known as **Digital Earth**.

Gore articulated a future where a young child could stand before a computer-generated three-dimensional spinning globe and access vast scientific, natural and cultural information to describe, entertain, and understand the Earth and its human activities. With information and services abundant on the Web and, now, the popularisation of geospatial systems through applications like Google Earth, this vision is an emerging reality.

Digital Earth symposia are held biennially in various international locations, the most recent being The Fifth International Symposium on Digital Earth (ISDE5; www.isde5.org) held in San Francisco in June 2007. A special Digital Earth Summit on Sustainability was held in Auckland in 2006 (DE06; www.digitalearth06.org.nz) with a view to returning to Auckland for successive summits between the symposia.

The International Society for Digital Earth (ISDE) has extended an invitation to again host a Digital Earth Summit on Sustainability in Auckland in September 2008.

In turn, this is an invitation from the organising committee of the Digital Earth New Zealand Society Incorporated to InternetNZ to become a strategic partner in the planning and delivery of this event.

"We are facing very challenging global issues, from the threat of change to our ecosystem, to a reduction in our biodiversity, the fast depletion of finite resources, and the rise of so many mega cities. Integrated data management can help us meet those challenges."

Rt Hon. Helen Clark at the opening of the 2006 Digital Earth Summit.

Conference Theme

People and technology working together to sustain social, cultural and economic development in a changing climate.

The best place New Zealanders can look to learn how to be members of a global community is within our own communities. Increasingly, we use digital means to find out what is going on within our families, in our neighbourhoods, across our cities and throughout the country.

Now, the challenge is to unlock information silos and build capacity in our networks and services to make sure that data can be shared and reused, across applications, across organisations, across sectors and throughout communities. Inevitably, the whole is more than the sum of the

parts. Technology and tools enable us to begin exploring and shaping a response to our changing environment.

As a nation able to work collaboratively across central government, local government, business, and non-governmental organisations, we will have the basis on which we can build a sustainable future for New Zealand.

Digital technologies are taking over from oil-based technologies as the factor which is shrinking distance between people. As a small, innovative and geographically isolated nation, New Zealand has potential to demonstrate development of digital capability ahead of the pack.

Conference Audience

The Digital Earth Summit 2008 aims to attract:

- Business people, including representatives of businesses that have a large impact on the economy and society and whose competitiveness may be at stake over sustainability as well as entrepreneurs, whose businesses may be the source of innovative solutions to sustainability problems.
- Decision makers, including regulators, policy makers, representatives of local and central government and politicians.
- Thought leaders, including academics, scientists and policy experts.
- Change agents, including community activists and leaders, representatives of NGOs, concerned citizens, students and young people.

Through DE08, these communities will explore how each other can contribute to sustainability for New Zealanders, New Zealand society and the economy as a whole.

Custodians of data will mix with people whose technology can turn that data into valuable information services, decision makers who can be informed by those services and representatives of the stakeholders who their policies will affect.

DE08's Aspirations for New Zealand

- New Zealand and the Pacific become more globally competitive
    - We build capability for evidence based and data driven decision making
- Increased access to opportunities for businesses
    - New revenue models are made available for business infrastructure, providing lower entry costs and lower marginal costs
- More effective collaboration between communities and local authorities
    - Information becomes democratised, the silos of local council data are broken down and become accessible over the Internet
    - New information systems – such as geospatial tools - are available to support integrated decision making
- Citizens are increasingly confident, enabled and empowered
    - There is free or low cost access to data held within the public sector, for example council data and data collected by Statistics NZ

- There are information management and access tools that support government's engagement with citizens, enabling citizens to understand and participate in decision making
- Young people are engaged in conversations about their future and the voices of those whose lives will be most affected by climate change are heard by today's leaders and decision makers

Relevance to InternetNZ

Digital Earth is an example of what is possible with the Internet and unthinkable without it.

InternetNZ's primary role is to promote and protect the Internet for New Zealand, with a specific focus on its physical - the network – and technical aspects. The support and development of the Internet's physical infrastructure is a critical component of the Digital Earth concept and a core message for DE08.

The functionality proposed by Digital Earth implies, indeed requires, the high-speed, open-access, end-to-end network that InternetNZ is working with network operators and the Government to achieve. DE08 will generate significant momentum for InternetNZ's campaign for better infrastructure and provide a platform from which InternetNZ can promote interoperability and open standards for emerging technologies.

In coming decades, the Internet will compete with transport and food production for increasingly scarce energy resources. InternetNZ's alignment with an initiative formally and publicly raising the sustainability issues of the Internet is invaluable. For many, the fiction of the permanence of the Internet has never been openly or publicly challenged. With Microsoft, Yahoo! and Google all building mega-datacentres that consume so much power they have to be located next to a hydro dam to be viable, New Zealand must have a platform to evaluate and review the fragility of cyberspace, which unavoidably depends on real-world infrastructure: real electrons, real energy and carbon costs at run time, in construction and at end-of-life.

DE08 provides a platform for InternetNZ to support our national identity objectives. The positioning of New Zealand as a centre of excellence for emerging technologies can only contribute to growth in the network and content and services for New Zealand, the Pacific and their peoples.

As an initiative supported by the Auckland City, along with its key business partners, DE08 provides a unique opportunity for InternetNZ to build depth into its relationships across the city, potentially enabling the genesis of Auckland based initiatives similar to Wellington City Council's inception of CityLink.

Opportunities for InternetNZ from DE08

- **Brand exposure**

DE08 presents a branding opportunity both within New Zealand and internationally to position InternetNZ as digital leaders.

- **Consistency with organisation's vision and values**

DE08 is aligned to InternetNZ's commitment to an open and uncapturable Internet, along with the democratization of data and the public's right of access to public data.

- **Benefit Cost**

Investment is at a manageable level and provides the potential to leverage the investment of other major supporters.

- **Influence and relationships**

Along with an early commitment to strategic support comes opportunity to:

- Support and influence strategic decisions such as the agenda and participants
- Build links and bridges with participating local government agencies and communities
- Establish as a legacy of our participation the opportunity to participate in subsequent events and initiatives linking to InternetNZ's core mission
- Build relationships and partnerships that outlive the event, such as relationships with international speakers
- Second selected international speakers for InternetNZ events (forums in other cities or advocacy meetings) at little marginal cost

InternetNZ's Investment

- Financial support
    - Underwrite the event start-up period
    - $100k cash sponsorship
- Thought leadership
    - Michael Wallmannsberger and Judy Speight's participation in the governance group provides an avenue for both direct and secondary support
- Logistical and administrative support
    - Via the Wellington secretariat
- Governance advice
    - Advice on the structure and governance of the DE08 entity
    - Support of critical path milestones
    - Representatives on the governing board of the DE08 entity ensure sound financial management and alignment with InternetNZ objectives

Rt. Hon Helen Clark

28/08/2006

Digital Earth Summit on Sustainability

Welcome to our distinguished speakers and participants. Your commitment to a connected and sustainable world has brought you to our country.

I see from the Summit Programme that we have here a mix of very big picture thinkers, expert scientists with a global perspective, and leading edge thinkers in technology.

We have connections across culture, peoples, disciplines, sectors, and technologies in this auditorium today.

I was fascinated by the Al Gore film "An Inconvenient Truth" which I saw at the film festival in Wellington last month.

It's a sign of the effectiveness of Al Gore's crusade on global issues that his film is packing out movie theatres around the world and raising awareness about global warming.

The stimulus for the Digital Earth initiative also came from Al Gore. And so, people are drawn from all over the world to conferences and symposia like this one for discussions on sustainability, urban issues, and harnessing technology so that we can measure and forecast human activity better.

I know there is debate between those who think innovative technology will provide solutions, no matter what happens in the future, and those who don't. That debate needs to be had.

It is great to see ninety young New Zealanders here, engaging directly with issues which will be pivotal both to their lives and the lives of future generations.

It was Einstein who once said: "We can't solve problems by using the same kind of thinking we used when we created them." Our hope may well lie in the innovative and lateral thinking of young people being set alongside the wisdom of those who have devoted a long lifetime to study of the issues.

This planet is the home which all of us share. This is the only place we can call home. Future generations call to us to care for and nurture the people and the places of this planet.

The Digital Earth Summit is timely. There is a growing feeling that we are at an important cross roads of our planet's history.

We are facing very challenging global issues, from the threat of change to our ecosystem, to a reduction in our biodiversity, the fast depletion of finite resources, and the rise of so many mega cities. Integrated data management can help us meet those challenges.

The Summit website refers to the Digital Earth initiative as a 'digital commons…a vast digital marketplace where citizens can access informational services… to understand the complex interaction between humanity's economic, social and cultural activities and our environment'.

Access to good information plays a key role in overcoming uncertainty and is fundamental to democratic decision making.

It is the responsibility of all of us to take collective action which will over time make a difference. Through science and technology, connecting globally and working collaboratively, we now have the ability to lift our thinking to a new level.

As stated in the Summit brochure, 'emerging technologies are enabling vast amounts of otherwise disparate data to be integrated to give us a much deeper understanding of our world, our environment and our communities This in turn allows us to make the decisions necessary to maximise the utility of resources and increase the sustainability of all our enterprises'.

The themes of these three days are important. I understand that you will hear:

- A reinforcement from speakers of the urgency of global concerns and how they might impact on New Zealand
- From others, the need to plan for both what we know, and for the level of uncertainty which remains, and to take practical action to manage the risks
- And from others, the importance of good quality integrated information, so that we can predict and manage risks such as the threat of weather extremities, sea level rise, and epidemics.

This summit brings together all these elements to give practical application to the concept of a virtual Earth.

Sustainable Development Programme of Action

I attended the World Summit on Sustainable Development in Johannesburg in 2002 and returned with a determination to make sustainable development meaningful in the New Zealand context.

Our Government identified four areas for action under a Sustainable Development Programme of Action:

- Energy
- Quality and allocation of fresh water
- Investing in child and youth development and
- Sustainable cities.

Our Sustainable Development Programme of Action established a set of guiding principles to define what government meant by 'sustainable development'.

Those principles direct us to consider: the long term implications of policy; innovative solutions; best information; risks, uncertainties and precaution; partnerships; transparency and participation; global perspectives; decoupling growth and environmental pressures; respecting environmental limits; partnering with Mâori and empowering Mâori development; and respecting human rights, law, and cultural diversity – all elements that are at the core of the agenda of this Summit.

A recent workshop sponsored by my own Department of Prime Minister and Cabinet suggested that these principles continue to be well received and applied.

They need to be applied through partnerships, which are becoming an established way of doing government business in New Zealand. In the 21st century governments cannot achieve their objectives without close collaboration and networking with stakeholders across the economy and society.

The relationship between central and local government is very important, which is why we meet at the highest levels of both in the central – local government forum every six months.

Working relationships with industry and business are important, and we appreciate the good relationship we have with groups like the New Zealand Business Council for Sustainable Development.

We need whole of government and New Zealand Incorporated approaches to sustainable development. No one actor has the magic wand. Our strength will lie in unity of purpose and a determination to work together.

Sustainability is now a key underlying principle in many areas of government policy.

It is inherent in the land transport legislation passed in 2003, and in the Local Government Act 2003.

Arising from the Local Government Act, councils all over New Zealand have just drawn up Long Term Council Community Plans, planning for the economic, social, and cultural wellbeing of their communities.

Arising from the Sustainable Development Programme of Action, a 'New Zealand Energy Strategy' is now in development with a focus on renewables and sustainability.

Intense work is being done on how to manage water allocation and conservation better.

We have committed to the Kyoto Protocol and to taking steps to reduce our greenhouse gas emissions over time. A comprehensive programme with fresh initiatives for forestry, land use, and transport is being developed.

As part of the Sustainable Development Programme of Action, we focused attention on our cities and quality urban design. Over 87 per cent of New Zealanders live in an urban environment, and we want our cities and towns to function well.

A lot of attention is being paid to how Auckland functions – or doesn't. It is our only metropolis of scale, and has long suffered from inadequate forward thinking, leaving it in the course of the last decade or so with traffic gridlock, water shortage, and power disruption.

Now local leadership is emerging determined to make a difference, and central government is engaging with it to find solutions and enable Auckland to reach its full potential.

Overall, I believe we are making significant strides towards sustainability in New Zealand.

The Resource Management Act of 1991 made us think about the environmental and social impacts of our actions.

We have a progressive social agenda, and a commitment to a cohesive society where all can reach their potential.

We have initiated significant steps towards reconciliation with Mâori as the indigenous people of our country, as well as emphasising inclusion of the many migrant peoples who settle here.

Our goal of economic transformation is underpinned by a strong awareness of the need for environmental and social sustainability too.

Digital strategy

New Zealand last year launched a nationwide Digital Strategy. We know that technology and good quality integrated information systems are the key to making sound decisions.

If we are able to manage our resources wisely from now on and build on modern technology and innovation, we will be able to forge a path which will enable New Zealanders to maintain our high quality of life.

Information and social engagement are key to that.

Working collaboratively, across central government, local government, business, and non-governmental organisations, we can build a sustainable future for New Zealand.

The place we can look to learn how to be a global community, is in our own community.

The school, the marae, the workplace, the council chamber, the country hall, - are all places where we can learn how to work together as a community. Increasingly, the way we find out about what is going on in our neighbourhood, our catchment, our city is by digital means.

We need to break down information silos, build our capacity in and our access to technology, and make sure that the data available across sectors and communities is compatible, and that the whole is more than the sum of the parts.

New Zealand is a small country on a small planet. It may be argued that digital technologies are taking over from oil-based technologies as the factor which is shrinking the distance between us.

Our Digital Strategy focuses on content, connectivity, and confidence as the core of creating a digital future for all New Zealanders - a world where we can find what we need to know to manage our individual, community, and national well being, have open access to that knowledge, and have the confidence to use it.

The use of digital tools and information to inform sustainable development is becoming the reality for New Zealand.

For example, in the environment sector, New Zealand is focused on how technology, and the data it provides, can best be applied to sustainability.

Not only are we one of the most internet connected countries in the world (788 internet users per 1000 people in 2004), but we have led the way internationally with the development of new digital ecosystem mapping techniques, called environment classifications.

The recently developed Land Environments New Zealand, River and Marine Environment Classifications, (known by their acronyms LENZ, REC, and MEC) can be put to use by people who work in conservation, farming, forestry, horticulture, public health, fishing and resource management.

They are powerful digital resource management tools.

They allow us to see where similar ecosystems are across New Zealand – from our mountains into our oceans.

We can use that information to make sound management decisions.

For example, at a regional level we can use digital climate, soils, and landform data from the Land Environment NZ classification to find areas suitable for high value crops.

This is an exciting prospect when we consider sustainable development and the opportunities in New Zealand for regional development. LENZ can also be applied to biodiversity management and even biosecurity.

The River Environment Classification organises and maps digital information about the physical characteristics of New Zealand’s rivers.

It is currently being used by a range of agencies including central and local government for different freshwater management purposes.

These include environmental assessments, policy development and environmental monitoring and reporting.

The Marine Environment Classification organises and maps digital information about the physical and biological characteristics of New Zealand’s oceans (across our Exclusive Economic Zone).

It is currently being used by a range of agencies including central and local government and the fishing industry for environmental assessments, policy development and environmental monitoring and reporting.

Internationally these classifications represent a significant achievement in the development and use of digital tools by New Zealand for sustainable development.

Using tools like these with other digital data and information we can look to our past, analyse our current situation, and plan for a sustainable future.

My best wishes for this Summit. May you engage, may you learn, and may you connect with one another. It is my pleasure now to declare the Summit open.

http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=26919

Vice President Al Gore

The Digital Earth: Understanding our planet in the 21st Century

Given at the California Science Center, Los Angeles, California, on January 31, 1998.

From - http://www.digitalearth.gov/
Direct Link - http://www.digitalearth.gov/VP19980131.html

A new wave of technological innovation is allowing us to capture, store, process and display an unprecedented amount of information about our planet and a wide variety of environmental and cultural phenomena. Much of this information will be "georeferenced" - that is, it will refer to some specific place on the Earth's surface.

The hard part of taking advantage of this flood of geospatial information will be making sense of it. - turning raw data into understandable information. Today, we often find that we have more information than we know what to do with. The Landsat program, designed to help us understand the global environment, is a good example. The Landsat satellite is capable of taking a complete photograph of the entire planet every two weeks, and it's been collecting data for more than 20 years. In spite of the great need for that information, the vast majority of those images have never fired a single neuron in a single human brain. Instead, they are stored in electronic silos of data. We used to have an agricultural policy where we stored grain in Midwestern silos and let it rot while millions of people starved to death. Now we have an insatiable hunger for knowledge. Yet a great deal of data remains unused.

Part of the problem has to do with the way information is displayed. Someone once said that if we tried to describe the human brain in computer terms, it looks as if we have a low bit rate, but very high resolution. For example, researchers have long known that we have trouble remembering more than seven pieces of data in our short-term memory. That's a low bit rate. On the other hand, we can absorb billions of bits of information instantly if they are arrayed in a recognizable pattern within which each bit gains meaning in relation to all the others — a human face, or a galaxy of stars.

The tools we have most commonly used to interact with data, such as the "desktop metaphor" employed by the Macintosh and Windows operating systems, are not really suited to this new challenge. I believe we need a "Digital Earth". A multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data.

Imagine, for example, a young child going to a Digital Earth exhibit at a local museum. After donning a head-mounted display, she sees Earth as it appears from space. Using a data glove, she zooms in, using higher and higher levels of resolution, to see continents, then regions, countries, cities, and finally individual houses, trees, and other natural and man-made objects. Having found an area of the planet she is interested in exploring, she takes the equivalent of a "magic carpet ride" through a 3-D visualization of the terrain. Of course, terrain is only one of the many kinds of data with which she can interact. Using the systems' voice recognition capabilities, she is able to request information on land cover, distribution of plant and animal species, real-time weather, roads, political boundaries, and population. She can also visualize the environmental information that she and other students all over the world have collected as part of the GLOBE project. This information can be seamlessly fused with the digital map or terrain data. She can get more information on many of the objects she sees by using her data glove to click on a hyperlink. To prepare for her family's vacation to Yellowstone National Park, for example, she plans the perfect hike to the geysers, bison, and bighorn sheep that she has just read about. In fact, she can follow the trail visually from start to finish before she ever leaves the museum in her hometown.

She is not limited to moving through space, but can also travel through time. After taking a virtual field-trip to Paris to visit the Louvre, she moves backward in time to learn about French history, perusing digitized maps overlaid on the surface of the Digital Earth, newsreel footage, oral history, newspapers and other primary sources. She sends some of this information to her personal e-mail address to study later. The time-line, which stretches off in the distance, can be set for days, years, centuries, or even geological epochs, for those occasions when she wants to learn more about dinosaurs.

Obviously, no one organization in government, industry or academia could undertake such a project. Like the World Wide Web, it would require the grassroots efforts of hundreds of thousands of individuals, companies, university researchers, and government organizations. Although some of the data for the Digital Earth would be in the public domain, it might also become a digital marketplace for companies selling a vast array of commercial imagery and value-added information services. It could also become a "collaboratory"-- a laboratory without walls — for research scientists seeking to understand the complex interaction between humanity and our environment.

Technologies needed for a Digital Earth

Although this scenario may seem like science fiction, most of the technologies and capabilities that would be required to build a Digital Earth are either here or under development. Of course, the capabilities of a Digital Earth will continue to evolve over time. What we will be able to do in 2005 will look primitive compared to the Digital Earth of the year 2020. Below are just a few of the technologies that are needed:

Computational Science: Until the advent of computers, both experimental and theoretical ways of creating knowledge have been limited. Many of the phenomena that experimental scientists would like to study are too hard to observe - they may be too small or too large, too fast or too slow, occurring in a billionth of a second or over a billion years. Pure theory, on the other hand, cannot predict the outcomes of complex natural phenomena like thunderstorms or air flows over airplanes. But with high-speed computers as a new tool, we can simulate phenomena that are impossible to observe, and simultaneously better understand data from observations. In this way, computational science allows us to overcome the limitations of both experimental and theoretical science. Modeling and simulation will give us new insights into the data that we are collecting about our planet.

Mass Storage: The Digital Earth will require storing quadrillions of bytes of information. Later this year, NASAs Mission to Planet Earth program will generate a terrabyte of information each day. Fortunately, we are continuing to make dramatic improvements in this area.

Satellite Imagery: The Administration has licensed commercial satellites systems that will provide 1-meter resolution imagery beginning in early 1998. This provides a level of accuracy sufficient for detailed maps, and that was previously only available using aerial photography. This technology, originally developed in the U.S. intelligence community, is incredibly accurate. As one company put it, "It's like having a camera capable of looking from London to Paris and knowing where each object in the picture is to within the width of a car headlight."

Broadband networks: The data needed for a digital globe will be maintained by thousands of different organizations, not in one monolithic database. That means that the servers that are participating in the Digital Earth will need to be connected by high-speed networks. Driven by the explosive growth of Internet traffic, telecommunications carriers are already experimenting with 10 gigabit/second networks, and terrabit networking technology is one of the technical goals of the Next Generation Internet initiative. The bad news is that it will take a while before most of us have this kind of

bandwidth to our home, which is why it will be necessary to have Digital Earth access points in public places like children's museums and science museums.

Interoperability: The Internet and the World Wide Web have succeeded because of the emergence of a few, simple, widely agreed upon protocols, such as the Internet protocol. The Digital Earth will also need some level of interoperability, so that geographical information generated by one kind of application software can be read by another. The GIS industry is seeking to address many of these issues through the Open GIS Consortium.

Metadata: Metadata is "data about data." For imagery or other georeferenced information to be helpful, it might be necessary to know its name, location, author or source, date, data format, resolution, etc. The Federal Geographic Data Committee is working with industry and state and local government to develop voluntary standards for metadata.

Of course, further technological progress is needed to realize the full potential of the Digital Earth, especially in areas such as automatic interpretation of imagery, the fusion of data from multiple sources, and intelligent agents that could find and link information on the Web about a particular spot on the planet. But enough of the pieces are in place right now to warrant proceeding with this exciting initiative.

Potential Applications

The applications that will be possible with broad, easy to use access to global geospatial information will be limited only by our imagination. We can get a sense of the possibilities by looking at today's applications of GIS and sensor data, some of which have been driven by industry, others by leading-edge public sector users:

Conducting virtual diplomacy: To support the Bosnia peace negotiations, the Pentagon developed a virtual-reality landscape that allowed the negotiators to take a simulated aerial tour of the proposed borders. At one point in the negotiations, the Serbian President agreed to a wider corridor between Sarajevo and the Muslim enclave of Gorazde, after he saw that mountains made a narrow corridor impractical.

Fighting crime: The City of Salinas, California has reduced youth handgun violence by using GIS to detect crime patterns and gang activity. By collecting information on the distribution and frequency of criminal activities, the city has been able to quickly redeploy police resources.

Preserving biodiversity: Planning agencies in the Camp Pendleton, California region predict that population will grow from 1.1 million in 1990 to 1.6 million in 2010. This region contains over 200 plants and animals that are listed by federal or state agencies as endangered, threatened, or rare. By collecting information on terrain, soil type, annual rainfall, vegetation, land use, and ownership, scientists modeled the impact on biodiversity of different regional growth plans.

Predicting climate change: One of the significant unknowns in modeling climate change is the global rate of deforestation. By analyzing satellite imagery, researchers at the University of New Hampshire, working with colleagues in Brazil, are able to monitor changes in land cover and thus determine the rate and location of deforestation in the Amazon. This technique is now being extended to other forested areas in the world.

Increasing agricultural productivity: Farmers are already beginning to use satellite imagery and Global Positioning Systems for early detection of diseases and pests, and to target the application of pesticides, fertilizer and water to those parts of their fields that need it the most. This is known as precision farming, or "farming by the inch."

The Way Forward

We have an unparalleled opportunity to turn a flood of raw data into understandable information about our society and out planet. This data will include not only high-resolution satellite imagery of the planet, digital maps, and economic, social, and demographic information. If we are successful, it will have broad societal and commercial benefits in areas such as education, decision-making for a sustainable future, land-use planning, agricultural, and crisis management. The Digital Earth project could allow us to respond to manmade or natural disasters - or to collaborate on the long-term environmental challenges we face.

A Digital Earth could provide a mechanism for users to navigate and search for geospatial information - and for producers to publish it. The Digital Earth would be composed of both the "user interface" - a browsable, 3D version of the planet available at various levels of resolution, a rapidly growing universe of networked geospatial information, and the mechanisms for integrating and displaying information from multiple sources.

A comparison with the World Wide Web is constructive. [In fact, it might build on several key Web and Internet standards.] Like the Web, the Digital Earth would organically evolve over time, as technology improves and the information available expands. Rather than being maintained by a single organization, it would be composed of both publicly available information and commercial products and services from thousands of different organizations. Just as interoperability was the key for the Web, the ability to discover and display data contained in different formats would be essential.

I believe that the way to spark the development of a Digital Earth is to sponsor a testbed, with participation from government, industry, and academia. This testbed would focus on a few applications, such as education and the environment, as well as the tough technical issues associated with interoperability, and policy issues such as privacy. As prototypes became available, it would also be possible to interact with the Digital Earth in multiple places around the country with access to high-speed networks, and get a more limited level of access over the Internet.

> Clearly, the Digital Earth will not happen overnight.
>
> In the first stage, we should focus on integrating the data from multiple sources that we already have. We should also connect our leading children's museums and science museums to high-speed networks such as the Next Generation Internet so that children can explore our planet. University researchers would be encouraged to partner with local schools and museums to enrich the Digital Earth project — possibly by concentrating on local geospatial information.
>
> Next, we should endeavor to develop a digital map of the world at 1 meter resolution.
>
> In the long run, we should seek to put the full range of data about our planet and our history at our fingertips.

In the months ahead, I intend to challenge experts in government, industry, academia, and non-profit organizations to help develop a strategy for realizing this vision. Working together, we can help solve many of the most pressing problems facing our society, inspiring our children to learn more about the world around them, and accelerate the growth of a multi-billion dollar industry.